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THE SOUTHERN PINE BEETLE EPIDEMIC IN SOUTHEAST TEXAS

1950-1951

I. Description of Conditions Favorable to Attack, Area Attacked, and Description of Characteristics of the Beetle

A. Conditions Favorable to Attacks

Conditions favorable to the increase of populations of the Southern Pine Beetle, Dendroctonus Frontalis, began building up in Liberty and surrounding counties possibly as early as 1947. Under normal conditions this insect is rather harmless and breeds only in dying limbs or very weak trees, or it may kill a few scattered trees. When climatic conditions are just right, particularly following several dry seasons and unusually mild winters, the beetle population suddenly increases. The average rainfall for the years 1946 - 1950 inclusive at Liberty was 55.15 inches. In 1947 the annual rainfall was approximately 45 inches. In 1948 the rainfall was only 32.26 inches. In 1949 the area received 67.15 inches, which is normal for the area. In 1950 only 32.87 inches of rainfall was received. Most of this fell during the first half of the year. There was a deficiency of 13.10 inches of rainfall in Liberty County in 1951.

Under conditions such as those described above this insect is capable of increasing at a ratio of 10 to 1 during each generation. Each generation is completed in approximately five weeks. In terms of trees killed at the end of the season, 100,000 trees could be killed for each one infested in the spring.

B. Description of Area and Timber (see attached map for area)

The stands in the epidemic areas were rather heterogeneous in nature. They were composed of bottomland hardwoods, a mixture of hardwood and pine, and pure pine. In the Devers and Batson areas especially the soil was rather heavy and drainage was poor. Palmetto was a very common plant found in the understory of these stands. The heavier stocked stands were found mostly on ownerships of more than 1000 acres which averaged as much as 8 m.b.f. per acre. These areas were the most heavily attacked. Loblolly pine, Pinus taeda, was the principal coniferous species and often obtained 18 inches in diameter in 30 years.

C. Beetle Characteristics

For a description of the beetle, including its characteristics and life cycle consult Circular #26 "The Southern Pine Beetle - Its Occurrence and Control in East Texas", published by the Texas Forest Service in October 1950 or "Pine Bark Beetles", Circular #43 published by the Texas Forest Service in 1955.

II. History of the Epidemic (Similar Outbreaks in 1911, 1926, 1939) The following events are approximately in chronological order:

A. Early Attack

This attack was probably first noticed by Tom Decker in 1949 in the vicinity of Strain Switch along the Missouri Pacific Railroad about four miles east of Hull.

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Sent Dr. R. B. Crozier
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Another early report was made by the Southern Pine Lumber Company in June of 1950 on their holdings in the Osborn League in Hardin County, just north of Strain Switch. It was also discovered by Pomeroy and McGowin northwest of Saratoga in June of 1949 while they were curising Kirby Lumber Corporation lands. The epidemic was first brought to the attention of the Gulfport laboratory of the Division of Forest Insect Investigations by Frederick Lemieux in July of 1950.

B. Morris Report

Robert C. Morris, Entomologist from the Gulfport laboratory visited the infested area north of Devers on August 1, 1950 to verify the identity of this insect. A 640 acre tract owned by the Grayburg Timber Company in T&NO Section 1 was visited by Morris and Chris Nelson of the Edens-Birch Lumber Company and Kenneth Nelson of the Southern Pine Lumber Company. Morris found all stages of the beetle on the perimeter of the affected area. He found trees that had shed their bark. This seemed to indicate that the beetle population had been building up for at least two years. The attack seemed to be spreading rapidly in a southwesterly direction at the time. The area was estimated to be about 100 acres in size.

At the same time a flight by Morris was made over the general area to determine its extent. Morris found the area between Raywood and Nome for about 20 miles north scattered with patches of red topped trees.

In his report of October 9, 1950, Morris stated that the outbreak was not receding and probably would continue for an indefinite period. He recommended cutting the infested logs and removing them from the area. He also recommended burning the slabs. He also recommended periodic inspections of the perimeter of infested areas for new attacks and a survey of the entire infested area.

C. Speer Report

"As part of the assistance given by the U. S. Bureau of Entomology, Charles F. Speers, Forest Insect Survey Station Leader of Ashville, North Carolina, made a trip to inspect the infested area in December 4, 1950.

At that time the Texas Forest Service estimated 32 million board feet of pine timber had been killed. At an estimated value of \$30.00 per thousand board feet, the timber had a stumpage value, before death, of \$960,000. The stumpage value of the material that could be salvaged was probably lowered by one third. Speers pointed out that more than stumpage prices were involved. If the timber was manufactured into lumber alone, it would represent a minimum value of over \$100 per thousand. If all these values were considered, the values threatened would be over \$150,000,000.

The Edens-Birch Lumber Company had a mill set up in the center of T&NO Section I which was capable of cutting 8,000 board feet per day. Speers found the Edens Birch Lumber Company was not concentrating on cutting the brood trees. Rather they were conducting a salvage operation in combination with control work. Very little in the way of natural effective control factors were found. Speers found infestations in groups of trees which were very easy to locate. Counts were made of trees attacked in the infested area. Speers stated that the build

up of insect populations during the past year had been slight. He found that in general, the ratio of trees infested at that time to the trees killed and in the red straw stage was approximately 1 to 5.

Speers recommended that areas of infestation should be plotted by aerial reconnaissance using PMA contact prints at a scale of 1:20,000. He also suggested that the infested areas should later be ground checked for accuracy. He also recommended that once the infested areas had been located, the brood trees should cut and removed from the area during the winter.

In Speers report, he estimated that three million board feet was infested. He also recommended that operators should concentrate on infested areas unless they were sure they could cut over all areas of infestation before spring".

D. Photographic Tests

Portions of the southern pine beetle epidemic area north of Devers were photographed on November 11, 1950 by J. L. Bean and R. C. Heller of the Bureau of Entomology and Plant Quarantine at Beltsville, Maryland.

The following information was obtained from the tests:

1. "Aerial photographs should be taken when the foliage is still green. In the fall many of the hardwoods are red or brown in color and can easily be confused with fading pines. Photographs taken in mid-winter would make separation of dead and dying pines from leafless hardwoods difficult".
2. "Color photographs were the easiest to interpret and probably the most accurate. For purposes of an insect survey one set of prints in color would be much more valuable than two sets of black and white prints and the cost of color transparencies would be no more expensive than black and white prints. While color film is roughly three times as expensive as black and white film, the cost of the film is seldom more than 5 percent of the cost of the delivered photos. In addition, the cost of making contact prints is eliminated in color photography.
3. The most desirable scale of aerial photography is 1:15840.
4. Black and white photography taken in the late summer before the hardwoods change color would emphasize the infested stands better than photography taken in the late fall.

The most practical and undoubtedly the cheapest method of surveying an area infested with the southern pine beetle is by the use of an airplane. Flying at an altitude of 3000-6000 feet, depending on cloud conditions, an observer can detect areas of infested timber from one to one and a half miles on either side of the plane. By using existing aerial photographs or detailed maps of the area it is possible to plot with some degree of accuracy, the locations of the infested areas. When comparing the color photos to the ocular mapping using PMA photographs it was noticed that some spots were plotted inaccurately on the

PMA photo and some spots were not discovered. It should be recognized that this method has its limitations. For general use and to determine if control measures are necessary, the ocular method should be sufficient. If intensive control measures are planned and the exact location of each infestation is desired, aerial photographs should be taken of the entire area infested. "This method would make it possible to locate exactly an infestation as small as one acre in size. The locating and treating of these small areas is just as important in a successful operation as the treatment of the larger areas."

E. Recommendations For Aerial Survey

As a result of the studies conducted by Heller and Bean in Texas during November 1950, the following conditions proposed for setting up and carrying out a general survey of the southern pine beetle:

1. A high-wing monoplane which provides maximum downward and lateral visibility with good slow flight characteristics is best suited for this work.
2. Aerial photographs already available from the PMA at a scale of 1:20,000 should be used by the observer. These photographs are small and when assembled to cover flight lines are not too bulky to use. They aid in keeping the observer oriented and in plotting and locating infestations.
3. Prior to flying an area the aerial photographs should be laid and north and south flight lines plotted on the assembled photographs. These flights can be plotted as far as three miles apart since the observer can map areas $1\frac{1}{2}$ miles from the flight lines. By taping a series of these photographs to a sheet of aluminum, approximately 23 inches square, the observer should be able to keep himself oriented and to plot infested areas accurately. A similar series of photographs should be available to the pilot.
4. It was found that the best altitude for this type of mapping was 3000-6000 feet, depending on cloud conditions. The plane should be flown at as slow a speed as possible (60-80 m.p.h.). Due to the blind spot beneath the plane the pilot should fly to one side of the flight lines.
5. On areas of heavy infestations, it may be necessary to re-fly the same flight line several times to allow the observer to locate and plot all of the infested stands he is able to recognize.
6. It was found that by looking through an orange colored filter there was more of a color contrast between the beetle killed (brown foliage) and the healthy trees. Therefore a pair of orange sun glasses would be of help to the observer, particularly during heavy haze conditions.

F. Texas Forest Service Flies Infested Area

In August, 1950 the Texas Forest Service flew the pine area south of a line from Conroe to Livingston to determine the area affected. A map was issued on August 25, 1950 showing where the infestations were concentrated. Through the press, personal contact, and mailing lists the landowners and the general public were informed of the location of the epidemic and methods for control of the epidemic. Plots were set up where the beetles were active to determine the rate and pattern of spread. District Forester Green was assigned to head up the work.

G. Publication of Bulletin on Southern Pine Beetle

In October, 1950 the Texas Forest Service issued Circular #26 "The Southern Pine Beetle, Its' Occurrence and Control in East Texas". It was distributed to all foresters and many timberland owners in East Texas.

H. Beetle Committee of TLMA Meets - BHC First Recommended

On October 2, 1950 the Beetle Committee of the Texas Lumber Manufacturers Association met at Devers with Morris and Kowal of the Gulfport Laboratory, the Head of the Forest Management Department, the Director, and District Forester Green. Procedures for locating infested areas were outlined. Benzene hexachloride was recommended for the first time at this meeting as a result of the Morris study.

I. Suneson Employed to Assist in TFS Beetle Control Program

On November 21, 1950 Victor Suneson was employed as Assistant District Forester in District 6. His duties were to locate the active spots in the epidemic areas, determine land ownership, inform the landowners of the presence of Southern Pine Beetles on their lands, and suggest control measures. As part of his duties he was to train landowners and their representatives to recognize brood trees. He was also to establish additional plots where beetles were active to determine pattern and rate of spread.

J. Demonstration and Training Session Held

On November 29, 1950 a demonstration and training session in connection with the control of the Southern Pine Beetle was held in the vicinity of Saratoga. Arthur Green, District Forester of the Texas Forest Service was in charge of the demonstration. Robert C. Morris of the Gulfport Laboratory was the principal speaker. The meetings was attended by representatives of the Southwestern Settlement and Development Corporation, Kirby Lumber Corporation, Southern Pine Lumber Company, the U. S. Forest Service, Champion Paper Company and other private landowners. Morris pointed out all identifiable characteristics of brood trees and discussed control by utilization. A short talk was given by George Stanley of the Kirby Lumber Corporation on aerial plotting of infested areas.

K. Beetle Committee of TLMA Meets - Pattern of Insect Attack Changed

On December 15 the Beetle Committee of the Texas Lumber Manufacturers Association met with Don Young, Head of the Forest Management Department, District Forester

Green, and Assistant District Forester Suneson at District 4 headquarters. Stanley reported 350 infested spots on Kirby's holdings, estimated a mortality of over 20 million board feet and plans for a strip cruise to locate other infestations. The pattern of spread changed in late November and early December from new infestations on the borders of old infestations to individual trees scattered throughout large areas. It was requested that larger landowners doing control work advise the Texas Forest Service of infestations on private holdings adjacent to their lands so that these owners could be urged to do control work.

L. Beetle Committee of TLMA Meets - Survey Planned

On February 7, 1951 the Beetle Committee of the Texas Lumber Manufacturers Association was held in the Director's office with all members present and Green, Spinney, Young, and Suneson. It was agreed that a survey would be made to determine the intensity of the Southern Pine Beetle infestation in the three major epidemic areas and to determine the pattern of spread within these areas. This survey was made in the three major epidemic areas in March and April of 1951. The results of the survey seemed to indicate that there was no pattern of spread for the Southern Pine Beetle.

M. Study Plots Established

About 15 study plots were set up in areas where no control work had been done. These areas were observed every two weeks and the direction and rate of spread noted. The study plots were watched very closely during the latter part of January and early February. A minimum temperature of 10° Fahrenheit and a maximum of 25° Fahrenheit were recorded during the last week in January. This low temperature apparently had no effect in reducing the beetle population. The beetles remained mostly in the larval and adult stages during the winter. A slight amount of emergence took place between January and April and a few newly infested trees were observed. Some lightly infested trees did not die. The infestation proceeded rather slowly until the first week in May, 1951. At that time a large number of new attacks were noticed on several of the study plots.

N. Beal Visits Texas

Dr. A. J. Beal, In Charge of Forest Insect Investigations of Bettsville, Maryland, stated in his visit to Texas during the spring of 1951 that:

1. temperatures of 5° above will kill some beetles in all stages but it took 0° for cold to be an effective control agent.
2. cutting alone was not an effective control measure and that water must bever the logs for two months to be an effective control measure.
3. an infested tree will attract flights from other areas.
4. utilization of brood trees will have a definite effect on reducing the quantity of timber killed over a two or three year period.

O. State Program of Aid to Private Landowners

1. A.A.A. photographs were obtained by the Texas Forest Service to

cover the epidemic areas. These photos were arranged in flight lines for each epidemic area. The flight lines were plotted on an aerial navigation map. Each flight line was flown twice with the observer looking out of one side and then the other. An Aeronica Champion was used to make most of the insect detection flights. Most of the flying was done from about 2000 feet. The aerial photos used were about 12 years old. Until some ground checking was done, the observer experienced difficulty in plotting the infestations accurately. The flights were made approximately at two week intervals between December, 1950, and June, 1951. Generally visibility for the beetle epidemic areas was about one and one half miles or more. The observer found that flying on days with poor visibility resulted in inaccurate plotting of locations or missing them entirely.

2. The aerial locations were transferred to land ownership maps. When infestations were ground checked the owner was notified by letter, phone call, or personal contact.

3. Landowners and their representatives were trained to recognize brood trees.

4. The public was kept informed of the progress of the epidemic through newspaper articles, talks, and one radio program.

III. Location of Infestation

A. Major Epidemic Areas

The infestations were confined to three major areas. (See attached map for locations) Between August and December 1950 all of the epidemic areas increased in size. Between August and December the epidemic spread in the Cleveland area to the east side of Highway 321 to the Baker and Pulido Surveys. In the Devers area the infestation spread to Cecil Boyt's land south of Highway 90.

B. Other Infestations

Other infestations were found at various times at Honey Island in Hardin County, the John Rhea Survey near Huffman in Harris County, on Highway 90 at Sheldon, the southwest corner of Polk County, in Montgomery County near Fostoria, on Texas Gulf Sulphur Company lands south of Liberty, at Kenefick northeast of Dayton. The infestation at Honey Island was brought under control by Kirby between August and December, 1950.

IV. Coyne Assigned to Epidemic Area

On June 5, 1951, J. F. Coyne of the Forest Insect Investigation of the Bureau of Entomology and Plant Quarantine was assigned to the epidemic area, with headquarters at Liberty, to conduct research on the Southern Pine Beetle.

V. Aerial Reconnaissance Made - An aerial reconnaissance was made on June 22 and 23rd, 1951. Visibility was from one half to three quarters of a mile. Most of the flying was done from an altitude of 400 to 800 feet. The object was to get a general picture

of the infestation from the air. No attempt was made to pinpoint any locations. The Devers and Cleveland areas appeared to be about the same size. The Batson area spread as far north as P. A. Racki's land just south of Rye. Spots were also located in the southwest corner of Polk County in the vicinity of the Segno Oil field, on Moss Tie Company land near Dayton, on Texas Gulf Sulphur Company land near the Chambers and Liberty County line, and on Keith Company land northeast of Sour Lake.

Approximately 50 individual spots were visible from the air. Most of these spots varied in size from several trees to ten acres. One spot of about fifteen acres was located. It was particularly noticeable that most of the spots contained brown topped trees only. Very few fading trees were observed. After the flight was made a number of individual spots were visited. Very few brood trees were observed. The most activity was noticed in Harris County at Sheldon and Huffman and in Hardin County near Sour Lake.

VI. Control Work - Control work was hampered by rain in December 1951 in all areas. Some control work was rendered ineffective by landowners unwilling to carry out control measures, particularly in the Devers area. In all areas 43,5000,000 board feet and 24,000 cords were estimated to have been killed. It was also estimated at a beetle meeting at Cleveland on July 26, 1951 that 25,000,000 board feet and 23,8000 cords of pulpwood had been salvaged.

A. Devers Area

The Southern Pine Lumber Company began control and salvage work on its' 4,000 acre tract in the Osborn League in Hardin County in the summer of 1950. Three and one quarter million board feet and 1500 cords of pulpwood were salvaged. One million six hundred thousand board feet and ten thousand cords of pulpwood died without being salvaged.

Three to four million feet of infested, dead, and green timber were cut by the Edens Birch Lumber Company on Grayburg Timber Company lands.

International Paper Company salvaged 91,000 board feet of sawlogs and 1055 cords of pulpwood.

Control work was also carried out by Southwestern Settlement and Development Cooperation, Texas Longleaf Lumber Company, Texas Company, and Champion Paper Company. Control work was carried out by three private landowners in this area.

B. Cleveland Area

Control work was carried out by Kirby Lumber Corporation on 23,000 acres in this area. Cutting was confined to dead and infested spots as they were found. Sawlog cuts were followed by pulpwood cuts. Due to the large number of single, scattered trees Kirby frequently made a systematic search of whole surveys. Mobile salvage units were used continually to cut brood trees and salvage dead trees. Rechecks of spots where dead and infested timber were frequently made if there were additional infested trees.

Champion Paper Company salvaged 110,000 board feet of sawlogs and 400 cords of pulpwood.

Foster Lumber Company carried out control work on 6500 acres in Liberty County k and salvaged 1,912,000 board feet of sawlogs.

James Garrett, forester with the Grogan L_umber Company, was shown infestations

on about 4000 acres of company land in Liberty County. He was given training in recognizing brood trees. About 315,000 board feet of sawtimber infested with the Southern Pine Beetle was cut. Another 80,000 board feet was lost.

C. Batson Area

Control work was carried out by Kirby Lumber Coporation on about 15,000 acres in this area. Green timber was cut in a few cases. The dead and infested trees were scattered. The Buchanan and Carriere Surveys were searched systematically for brood trees. In some cases logs were skidded for one quarter of a mile. On the Buchanan Survey Kirby used a 15 man crew consisting of four timber markers, three saw crews, one saw filer and three men on a caterpillar tractor.

Some control work was also done by Edens-Birch Lumber Company on Grayburg Timber Company lands by P. A. Racki.

VII. Epidemic Subsides - During the summer of 1951 the spots located in the June flight at Huffman and Sheldon in Harris County died out without any control work being done. These two spots, along with spots in the major epidemic areas, were examined on the ground in September 1951.

Numerous red topped trees were found. The beetles had emerged from these trees. Green topped trees nearby were covered with pitch tubes. The pitch was beginning to harden in some cases. Clerid beetles seemed to be more numerous than had previously been observed. Beneath the bark dead adults, larvae, and pupae were observed. Not one live beetle was found.

During the same time the Southern Pine Beetle Epidemic was apparently dying out there was a noticeable increase in Ips activity, particularly in the Cleveland area. It is also noted that there was a deficiency of over five inches of rainfall during this period.

The last live Southern Pine Beetle was found in a tree infested with Ips in October 1951. The Ips and Southern Pine Beetle galleries were side by side.

VCS/ev
2/18/59

Machine Copy sent to Leroy

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